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No. 47—1919.

British Engineering Standards Association.

(*Incorporated 1918.*)

FORMED IN 1901 AS THE ENGINEERING STANDARDS COMMITTEE
BY
THE INSTITUTION OF CIVIL ENGINEERS.
THE INSTITUTION OF MECHANICAL ENGINEERS.
THE INSTITUTION OF NAVAL ARCHITECTS.
THE IRON AND STEEL INSTITUTE.
THE INSTITUTION OF ELECTRICAL ENGINEERS

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BRITISH STANDARD SPECIFICATION AND SECTIONS FOR STEEL FISHPLATES FOR

BRITISH STANDARD BULL HEAD RAILWAY RAILS

(FOR RAILS FROM 70 LBS. TO 100 LBS. PER YARD INCLUSIVE)

AND FOR

BRITISH STANDARD FLAT BOTTOM RAILWAY RAILS

(FOR RAILS FROM 25 LBS. TO 100 LBS. PER YARD INCLUSIVE).

(REVISED JUNE, 1919.)

LONDON:
PUBLISHED FOR THE ASSOCIATION BY CROSBY LOCKWOOD & SON,
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June, 1919.

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NOTE.—*The Association desires to call attention to the fact that this Specification is intended to include the technical provisions necessary for the supply of the material herein referred to, but does not purport to include all the necessary provisions of a Contract.*

NOTE.—*It is to be understood that the British Engineering Standards Association in no case guarantees that the goods bearing its Mark are made to the Standard Sections and Specifications issued by them. The mark is to be regarded as no more than primâ facie evidence adduced by the manufacturer that the goods are made in accordance with the Standard Sections issued by the British Engineering Standards Association.*

BRITISH

STANDARD SPECIFICATION

FOR

STEEL FISHPLATES FOR RAILWAY RAILS.

Classes of Fishplates.

1. The steel for British Standard Fishplates shall be of two classes :—

(A) Ordinary Carbon Steel,
(B) Higher Carbon Steel,

as may be specified by the Engineer (or by the Purchaser).

Quality and Chemical Composition of Steel.

2. *Class A, Ordinary Carbon Steel,* shall be of the best quality made by the Bessemer, Open Hearth, or other process, as may be approved by the Engineer* (or by the Purchaser), and shall show on analysis that in chemical composition it conforms to the following limits :—

Carbon	... ...	from 0·20 to 0·30 per cent.
Manganese	... ...	not to exceed 0·80 ,, ,,
Silicon	... ...	,, ,, ,, 0·15 ,, ,,
Phosphorus	... ...	,, ,, ,, 0·06 ,, ,,
Sulphur	... ...	,, ,, ,, 0·06 ,, ,,

Class B, Higher Carbon Steel, shall be of the best quality made by the Open Hearth (Acid or Basic), or by the Bessemer (Acid) process, as may be approved by the Engineer* (or by the Purchaser),

* The word "Engineer" throughout this Specification shall mean the Engineer or firm of Engineers supervising or acting as Engineer or Engineers for the Purchaser, or in connection with the works for which the Fishplates are required.

and shall show on analysis that in chemical composition it conforms to the following limits :—

Carbon	from 0·30 to 0·40	per cent.
Manganese	not to exceed 0·80	,, ,,
Silicon	,, ,, ,, 0·15	,, ,,
Phosphorus	,, ,, ,, 0·06	,, ,,
Sulphur	,, ,, ,, 0·06	,, ,,

Analyses for Carbon.

3. The Manufacturer shall, before the Fishplates are rolled, make a carbon determination of each cast of steel proposed to be used, which determination shall conform to the carbon limits referred to in Clause 2, and shall furnish these determinations to the Engineer or the Inspector † (or to the Purchaser).

Complete Chemical Analyses.

4. The Manufacturer shall also make and furnish to the Engineer or the Inspector (or to the Purchaser) complete chemical analyses after the Fishplates have been rolled. Such analyses shall be made from drillings taken from completed Fishplates selected by the Engineer or the Inspector (or by the Purchaser), and shall show that the chemical composition conforms to the limits in Clause 2 hereof.

Number of Chemical Analyses.

5. One complete chemical analysis shall be made and furnished from each cast or part thereof.

Tensile Test Pieces.

6. The tensile strength and elongation of the steel used in the manufacture of the Fishplates shall be determined from Standard Tensile Test Pieces **C** or **D.** (See Appendix, page 25.)

The Standard test piece selected must be as near the full thickness of the Fishplate as possible.

Tensile Test.

7. The steel used in the manufacture of the Fishplates shall have the following tensile breaking strength and percentage of elongation when tested upon Standard Test Pieces **C** or **D.** (See Appendix, page 25.)

	Tensile Breaking Strength. Tons per sq. in.	Minimum Elongation per cent.
Class A—Ordinary Carbon Steel ...	28 to 35	22
Class B—Higher Carbon Steel ...	36 to 42	20

† The word "Inspector" throughout this Specification shall mean any person expressly authorised in writing by the Engineer (or by the Purchaser) to perform the duties herein referred to or any of them.

Number of Tensile Tests.

8. One tensile test shall be taken from each cast if the cast consists of 20 tons of Fishplates or under, and two tensile tests shall be taken if the cast consists of more than 20 tons.

Bend Test (Cold).

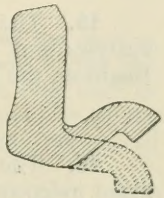
9. The finished Fishplates shall withstand the following cold bend tests without showing any signs of fracture.

A Shallow Fishplate and an Angle Fishplate with the flange sheared off at the angle shall be bent cold through an angle as follows :—

	Angle of Bend between Bolt Holes.	Maximum Internal Radius of Bend.
Class A—Ordinary Carbon Steel ...	180°	1½ inches.
Class B—Higher Carbon Steel ...	120°	1½ inches.

The sheared surface of the web of the Angle Fishplates shall be machined or dressed to a smooth surface before bending.

The flange of an Angle Fishplate must withstand being bent upwards through an angle of 45 degrees as shown in sketch.



Number of Bend Tests.

10. One cold bend test shall be taken from each cast if the cast consists of 20 tons of Fishplates or under, and two cold bend tests shall be taken if the cast consists of more than 20 tons.

Casts to be kept separate.

11. The Fishplates from each cast shall be kept separate until the analyses and tests have been completed and the results have been approved by the Engineer or the Inspector (or by the Purchaser).

Selection of Test Pieces.

12. All Test Pieces and Fishplates for testing shall be selected in accordance with Clauses 8 and 10. They shall be selected by the Engineer, the Inspector or the Purchaser.

Non-compliance with Tests and Requirements.

13. Should the steel of any of the Fishplates fail to comply on analysis with the specified limits referred to in Clauses 2, 3 and 4 hereof, the whole of the Fishplates in the cast of which the test pieces form part may, subject to the option of making additional tests as provided in Clause 14, be rejected.

Should any of the Fishplates fail otherwise to comply with the tests and requirements of this Specification, the whole of the Fishplates may, subject to the option of making additional tests as provided for in Clause 14, be rejected.

Additional Tests.

14. Should a Tensile Test Piece break outside the middle half of its gauge length, the test may, at the maker's option, be discarded, and another test be made on another Fishplate from the same cast.

In all other cases, should any of the Test Pieces first selected fail to comply with the tests and requirements of this Specification, two additional tests and analyses may be made from other Fishplates, and should either of these fail to fulfil such analyses and tests, all the steel or Fishplates from the casts from which the Test Pieces have been taken may be rejected.

The additional tests shall be made at the Manufacturer's expense, and shall be carried out in the same manner in all respects as the tests hereinbefore required to be made in the first instance.

Tests at Manufacturer's Works.

15. The Manufacturer shall carry out the foregoing tests, analyses and determinations at his works in the presence of the Engineer, the Inspector (or the Purchaser).

Independent Tests and Analyses.

16. The Engineer (or the Purchaser) shall be at liberty to make independent analyses, determinations or tests.

These analyses, determinations and tests shall be carried out in accordance with the foregoing provisions at the cost of the Purchaser, and by some independent expert or experts to be mutually agreed upon, or (failing agreement within six days after written notice by either party) by an expert or experts to be appointed at the request of either party by the Chairman for the time being of the British Engineering Standards Association, and the certificate or certificates of such expert or experts shall be accepted by the Engineer (or by the Purchaser) and the Manufacturer as conclusive of the results of such analyses, determinations and tests.

Manufacture.

17. All ingots used for the manufacture of the Fishplates shall be cogged down into blooms and rolled into the finished Fishplate bars, from each end of which sufficient crop shall be sheared to ensure that all unsound portions have been removed.

Fishplates to be free from Defects.

18. All Fishplates shall be of uniform section and carefully finished, and shall be clean, straight, and without bulges on the fishing faces, and free from cracks, laminations, burrs and defects of every kind.

Straightening.

19. Any necessary straightening shall be done when the Fishplates are hot, by pressure and not by hammering.

Fishplates to be sawn to Length.

20. All Fishplates shall be sawn to the specified length, the ends shall be quite square, and the burrs caused by the saw shall be removed.

Holes in Fishplates.

21. The holes for the fishbolts shall be punched at right angles through the section, whilst the Fishplates are hot, at one stroke of the machine; they must be clean, without burrs on either side, accurate in pitch, and exactly in the position shown on the drawings attached to this Specification, or, if so required, to a drawing to be supplied by the Engineer (or by the Purchaser).

Size of Holes.

22. No variation from this Specification or from the drawing before mentioned, as the case may be, will be allowed in the size or position of the holes, with the sole exception that they may be slightly larger than the dimensions in this Specification or in the drawing before mentioned, provided such variation does not exceed $\frac{1}{32}$ inch.

Notches for Dog Spikes or Coach Screws.

23. The placing and size of the notches for the dog spikes or coach screws in the case of Fishplates for Flat Bottom Rails shall be carried out in accordance with the requirements of the Engineer (or of the Purchaser).

Fishplates to conform to Templates.

24. Each section of Fishplate shall be accurately rolled to its respective template, and each Fishplate shall take a true bearing in a metal stud gauge planed to the correct contour of the rail. The gauge shall be approved by the Engineer (or by the Purchaser).

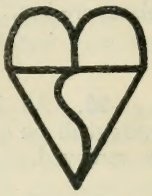
Templates.

25. Before the rolling of the Fishplates is commenced the Manufacturer shall, if required by the Engineer (or by the Purchaser), submit for his approval two sets of templates, internal and external, of approved material for each British Standard section of Fishplate.

Each template shall be suitably engraved with the name of the work for which they are required (or Purchaser's name), the number of the British Standard section, the Manufacturer's name and address, and the date of the contract.

Branding.

26. The brand (*see* sketch) shall be rolled in raised letters, or stamped on each Fishplate, to show that the Fishplate is of British Standard section; the number of the "B.S." section (being the number of the "B.S." rail section to which the Fishplate belongs), the process* by which the Fishplates have been manufactured, the Manufacturer's name, initials, or other recognised mark, and the month and year of manufacture shall be rolled or stamped in letters of such form and size and in such a position as may be directed by the Engineer (or by the Purchaser), *e.g.*, B.S. 95, B.A.*.....9.19.



Dipping in Boiled Oil.

27. If required by the Engineer (or by the Purchaser), all Fishplates, after approval by the Engineer (or by the Purchaser) shall be dipped into hot boiled linseed oil and wired up in suitable bundles.

Notice of Rolling.

28. The Manufacturer shall give to the Engineer or the Inspector (or to the Purchaser) at least seven clear days' notice, in writing, before the rolling of the first lot of Fishplates, and at least three clear days' notice before the rolling of any subsequent lot of Fishplates is commenced, in order that arrangements may be made for the presence of the Inspector at the rolling. A sample section shall be approved before any others than the sample bars have been rolled.

Inspection.

29. The Engineer or the Inspector (or the Purchaser) shall have free access to the works of the Manufacturer and to all places under his control at all reasonable times, and shall be at liberty to inspect the manufacture at all stages.

Delivery.

30. No Fishplates shall be despatched from the Manufacturer's works until the specified analyses, determinations, tests and requirements have been complied with and the Fishplates have been certified as satisfactory by the Engineer or the Inspector (or by the Purchaser).

Testing Facilities.

31. The Manufacturer shall at his own expense supply all templates and gauges, supply and prepare all test pieces and samples of steel, and supply all labour and apparatus for testing which may

---

* The following abbreviations are recommended :—

O.A. Open hearth Acid.
O.B. Open hearth Basic.
B.A. Bessemer Acid.
B.B. Bessemer Basic.

be necessary or which may be required by the Engineer (or by the Purchaser) for carrying out the tests and requirements of this Specification at the Manufacturer's works. The Manufacturer shall also supply all test pieces, portions of each cast, samples of steel and drillings for carrying out the independent tests and analyses provided for in Clause 16. If the Manufacturer shall fail to perform the foregoing obligations, or any of them, the Engineer (or the Purchaser) shall be at liberty to perform the said obligations, or any of them, which the Manufacturer has failed to perform, either at the Manufacturer's works or elsewhere, and charge the cost and expenses thereof to the Manufacturer.

Arbitration.

32. In case any dispute shall arise between the parties to any contract in which this Specification is in whole or part incorporated as to whether the Fishplates or any of them are or are not in accordance with the requirements of this Specification, or as to whether any obligation, requirement, analysis, determination or test of this Specification has been performed, carried out and/or complied with, then such dispute shall be referred to the arbitration of a person to be agreed upon between the parties, or, failing agreement. to be appointed, at the request of either party to the said dispute, by the Chairman for the time being of the British Engineering Standards Association, provided always that if such dispute is within the terms of any other agreement to refer or submit to arbitration, or if the decision of the Engineer is, by the terms of any contract for the supply of the Fishplates the subject of the dispute, or by the terms of any contract for the works for which such Fishplates are required, made final, this clause shall be of no effect.

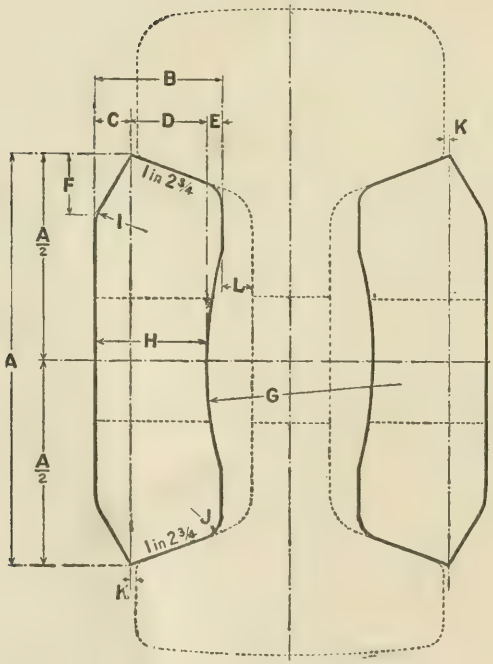
TABLES.

Tables I and II. British Standard Fishplates for Bull Head Rails.

Tables III, IV and V. British Standard Fishplates for Flat Bottom Rails.

BRITISH STANDARD FISHPLATES
FOR
BULL HEAD RAILS.

KEY TO TABLE I.



BRITISH STANDARD FISHPLATES
FOR
BULL HEAD RAILS.

TABLE I.

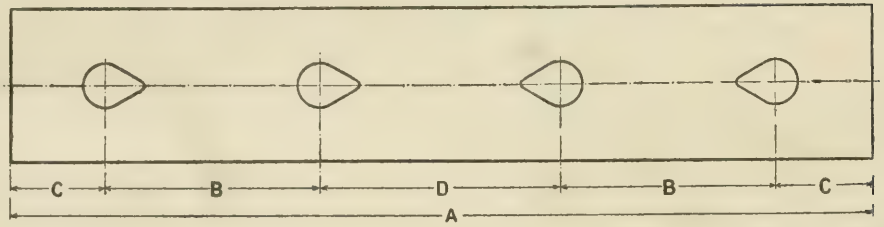
No of B.S. Section of Rail.	70	75	80	85	90	95	100
A	ins. 3 7/32	ins. 3 7/32	ins. 3 7/16	ins. 3½	ins. 3½	ins. 3½	ins. 3½
B	1	1	1 1/16	1⅛	1⅛	1⅛	1⅛
C	9/32	9/32	5/16	21/64	21/64	21/64	21/64
D	19/32	19/32	⅝	43/64	43/64	43/64	43/64
E	⅛	⅛	⅛	⅛	⅛	⅛	⅛
F	7/16	7/16	½	17/32	17/32	17/32	17/32
G	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16
H	⅞	⅞	15/16	1	1	1	1
I	½	½	½	½	½	½	½
J	3/16	3/16	3/16	3/16	3/16	3/16	3/16
*K	1/16	1/32	3/64	5/64	3/64	3/64	3/64
*L	17/64	¼	¼	9/32	¼	¼	¼

* K and L are given to the nearest $\frac{1}{64}$ inch.

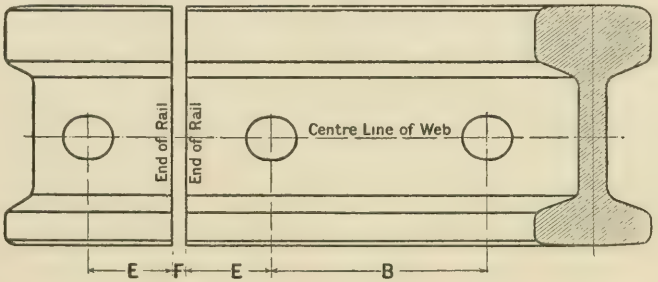
BRITISH STANDARD FISHPLATES FOR BULL HEAD RAILS.

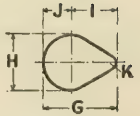
KEY TO TABLE II.

POSITION OF BOLT HOLES IN FISHPLATE.



POSITION OF BOLT HOLES AT END OF RAILS.





BOLT HOLE IN FISHPLATE.

BOLT HOLE IN RAIL.

BRITISH STANDARD FISHPLATES

FOR

BULL HEAD RAILS.

*TABLE II.

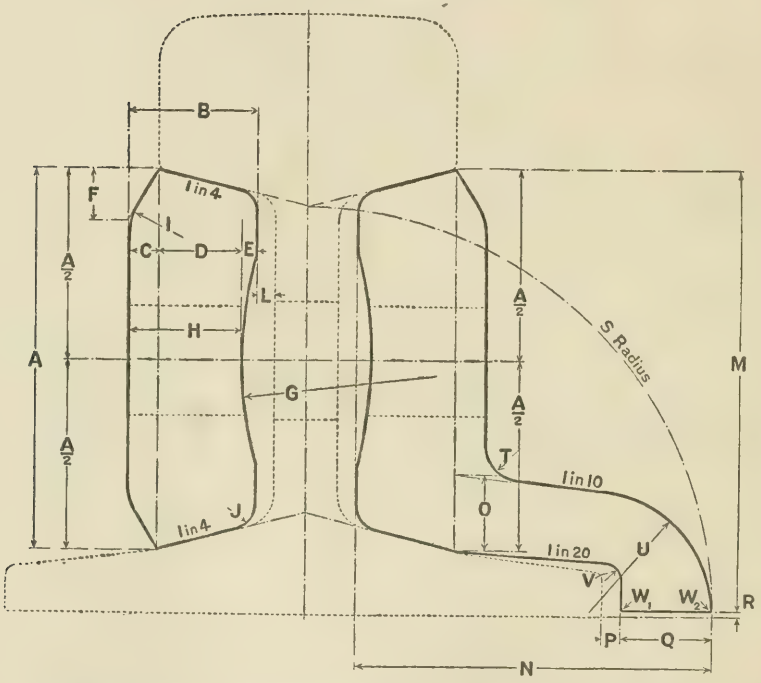
No. of B.S. Section of Rail.		70	75	80	85	90	95	100	Remarks.
Length of Fishplates.	A	ins. 18	ins. 18	ins. 18	ins. 18	ins. 18	ins. 18	ins. 18	
Centres of Bolt Holes in Fishplates.	B	4½	4½	4½	4½	4½	4½	4½	
	C	2	2	2	2	2	2	2	
	D	5	5	5	5	5	5	5	
Centres of Bolt Holes in Rails.	B	4½	4½	4½	4½	4½	4½	4½	
	E	2⅜	2⅜	2⅜	2⅜	2⅜	2⅜	2⅜	For Rails up to 45 ft. in length.
		2 11/32	2 11/32	2 11/32	2 11/32	2 11/32	2 11/32	2 11/32	For Rails above 45 ft. in length.
Clearance between Rails. Measured when the holes in rails and fishplates are concentric.	F	¼	¼	¼	¼	¼	¼	¼	For Rails up to 45 ft. in length.*
		5/16	5/16	5/16	5/16	5/16	5/16	5/16	For Rails above 45 ft. in length.†
Dimensions of Bolt Holes in Fishplates.	G	1¼	1¼	1 5/16	1 5/16	1 5/16	1 5/16	1 5/16	
	H	15/16	15/16	1	1	1	1	1	
	I	25/32	25/32	13/16	13/16	13/16	13/16	13/16	
	J	15/32	15/32	½	½	½	½	½	
	K Radius	3/32	3/32	3/32	3/32	3/32	3/32	3/32	
Dimensions of Bolt Holes in Rails.	L	1 5/16	1 5/16	1⅛	1⅛	1⅛	1⅛	1⅛	For Rails up to 45 ft. in length.
		1⅛	1⅛	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16	For Rails above 45 ft. in length.
	M	1	1	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	
	N	½	½	17/32	17/32	17/32	17/32	17/32	
	O	1/16	1/16	1/16	1/16	1/16	1/16	1/16	For Rails up to 45 ft. in length
		⅛	⅛	⅛	⅛	⅛	⅛	⅛	For Rails above 45 ft. in length.
Diameter of Fishbolt.		⅞	⅞	15/16	15/16	15/16	15/16	15/16	
WEIGHT PER PAIR IN LBS.									
		26¼	26¼	29¾	32¼	32¼	32¼	32¼	

* Total allowance for expansion and contraction = ½ inch (⅜ inch in Rails and ⅛ inch in Fishplates).

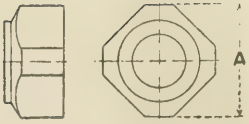
† Total allowance for expansion and contraction = ⅝ inch (½ inch in Rails and ⅛ inch in Fishplates).

BRITISH STANDARD FISHPLATES
FOR
FLAT BOTTOM RAILS.

KEY TO TABLE III.



NOTE.—The above arrangement of one Shallow and one Angle Fishplate is not put forward as a Standard, the two forms of Fishplate being shown on one diagram for convenience of lettering.



When Square Nuts are required to be used with the Standard Angle Fishplates the Association suggests the use of a special nut having the corners cut off until the dimension **A** in the sketch equals the width across corners of a British Standard Whitworth Hexagon Nut. The width across the flats and the thickness of the Nut (excluding that of the washer, which is here shown in one piece with the nut), will be equal to those laid down for Hexagon Nuts in the Report (No. 28—1908) on British Standard Nuts, Bolt Heads, and Spanners.

BRITISH STANDARD FISHPLATES
FOR
FLAT BOTTOM RAILS.

TABLE III.

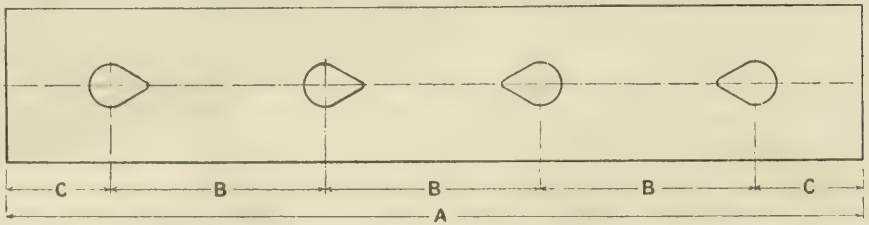
No. of B.S. Section of Rail.	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
A	1 3/4	1 57/64	2 3/64	2 15/64	2 25/64	2 1/2	2 5/8	2 3/4	2 53/64	2 15/16	3 1/16	3 3/16	3 5/16	3 7/16	3 37/64	3 11/16
B	9/16	39/64	21/32	45/64	3/4	51/64	27/32	57/64	15/16	63/64	1 1/32	1 5/64	1 1/8	1 11/64	1 7/32	1 17/64
C	1/16	3/64	3/64	3/64	5/64	3/32	7/64	7/64	11/64	13/64	15/64	17/64	9/32	19/64	5/16	21/64
D	—	—	—	—	37/64	19/32	5/8	43/64	41/64	21/32	43/64	11/16	23/32	3/4	25/32	13/16
E	—	—	—	—	3/32	7/64	7/64	7/64	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
F	3/8	9/32	9/32	9/32	5/16	3/8	7/16	7/16	19/64	23/64	13/32	29/64	31/64	33/64	35/64	9/16
G	—	—	—	—	1 7/8	2	2 1/4	2 1/2	2 5/8	2 3/4	2 7/8	3	3 1/4	3 1/2	3 3/4	4
H	—	—	—	—	21/32	11/16	47/64	25/32	13/16	55/64	29/32	61/64	1	1 3/64	1 3/32	1 9/64
I	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
J	1/8	1/8	1/8	1/8	5/32	5/32	5/32	5/32	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16
L	7/64*	7/64	7/64*	7/64*	7/64*	1/8	7/64	1/8*	5/32*	5/32*	5/32	5/32*	5/32	5/32	5/32*	5/32*
M	1 31/32	2 9/64	2 5/16	2 33/64	2 11/16	2 13/16	2 31/32	3 1/8	3 3/16	3 23/64	3 1/2	3 21/32	3 25/32	3 15/16	4 5/64	4 13/64
N	1 39/64	1 3/4	1 57/64	2 1/16	2 13/64	2 19/64	2 27/64	2 5/16	2 37/64	2 23/32	2 27/32	2 31/32	3 3/32	3 15/64	3 3/8	3 15/32
O	5/16	11/32	3/8	13/32	7/16	15/32	1/2	33/64	17/32	9/16	19/32	5/8	21/32	11/16	23/32	3/4
P	7/64	7/64	7/64	7/64	1/8	1/8	1/8	1/8	5/32	5/32	5/32	5/32	5/32	5/32	5/32	5/32
Q	23/64	25/64	27/64	31/64	33/64	17/32	37/64	5/8	19/32	21/32	45/64	3/4	25/32	53/64	7/8	57/64
R	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
S	1 27/32	2	2 5/32	2 11/32	2 33/64	2 5/8	2 49/64	2 29/32	2 31/32	3 1/8	3 17/64	3 13/32	3 17/32	3 13/64	3 13/16	3 59/64
T	3/16	3/16	3/16	3/16	1/4	1/4	1/4	1/4	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
U	3/4	3/4	3/4	3/4	7/8	7/8	7/8	7/8	1	1	1	1	1	1	1	1
V	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
W_1 W_2	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32

* Approximate.

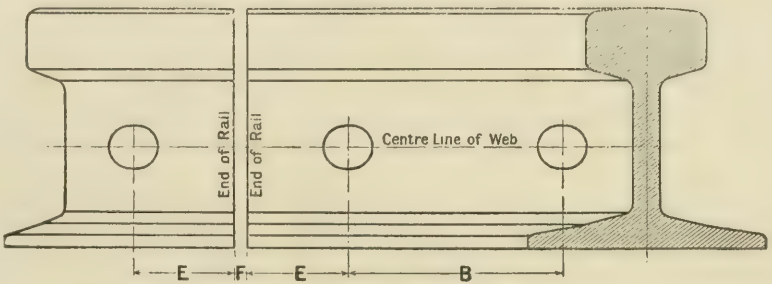
BRITISH STANDARD 4-BOLT FISHPLATES FOR FLAT BOTTOM RAILS.

KEY TO TABLE IV.

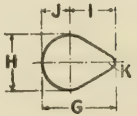
POSITION OF BOLT HOLES IN FISHPLATE.



POSITION OF BOLT HOLES AT END OF RAILS.

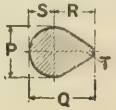


BOLT HOLE IN FISHPLATE.



BOLT HOLE IN RAIL.

SECTION OF FISH BOLT NECK.



BRITISH STANDARD 4 BOLT FISHPLATES

FOR

FLAT BOTTOM RAILS.

TABLE IV.

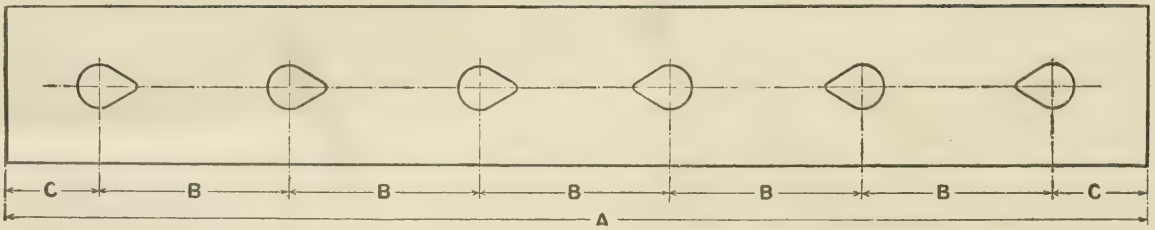
No. of B.S. Section of Rail.		25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
Length of Fishplate.	A	ins. 14	ins. 14	ins. 14	ins. 14	ins. 16	ins. 16	ins. 16	ins. 16	ins. 16	ins. 16	ins. 16	ins. 18	ins. 18	ins. 18	ins. 18	ins. 18
Centres of Bolt Holes in Fishplates.	B	3½	3½	3½	3½	4	4	4	4	4	4	4	4½	4½	4½	4½	4½
	C	1¾	1¾	1¾	1¾	2	2	2	2	2	2	2	2¼	2¼	2¼	2¼	2¼
Centres of Bolt Holes in Rails.	B	3½	3½	3½	3½	4	4	4	4	4	4	4	4½	4½	4½	4½	4½
	E	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	2⅛	2⅛	2⅛	2⅛	2⅛
Clearance between Rails.	F	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Dimensions of Bolt Holes in Fishplates.	G	49/64	55/64	59/64	1 1/64	1 3/32	1 3/32	1 3/32	1 11/64	1 11/64	1¼	1¼	1¼	1 21/64	1 21/64	1 13/32	1 13/32
	H	9/16	5/8	11/16	¾	13/16	13/16	13/16	⅞	⅞	15/16	15/16	15/16	1	1	1 1/16	1 1/16
	I	31/64	35/64	37/64	41/64	11/16	11/16	11/16	47/64	47/64	25/32	25/32	25/32	53/64	53/64	⅞	⅞
	J	9/32	5/16	11/32	3/8	13/32	13/32	13/32	7/16	7/16	15/32	15/32	15/32	½	½	17/32	17/32
	K Radius	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32
Dimensions of Bolt Holes in Rails.	L	¾	13/16	⅞	15/16	1	1	1	1 1/16	1 1/16	1 1/8	1 1/8	1 1/8	1 3/16	1 3/16	1¼	1¼
	M	⅝	11/16	¾	13/16	⅞	⅞	⅞	15/16	15/16	1	1	1	1 1/16	1 1/16	1 1/8	1 1/8
	N	5/16	11/32	3/8	13/32	7/16	7/16	7/16	15/32	15/32	½	½	½	17/32	17/32	9/16	9/16
	O	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛
Diameter of Fishbolt.	P	½	9/16	⅝	11/16	¾	¾	¾	13/16	13/16	⅞	⅞	⅞	15/16	15/16	1	1
Section of Fishbolt Neck.*	Q	45/64	51/64	55/64	61/64	1 1/32	1 1/32	1 1/32	1 7/64	1 7/64	1 3/16	1 3/16	1 3/16	1 7/64	1 7/64	1 11/32	1 11/32
	R	29/64	33/64	35/64	39/64	21/32	21/32	21/32	45/64	45/64	¾	¾	¾	51/64	51/64	27/32	27/32
	S	¼	9/32	5/16	11/32	⅜	⅜	⅜	13/32	13/32	7/16	7/16	7/16	15/32	15/32	½	½
	T Radius	1/32	1/32	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
WEIGHT PER PAIR IN LBS.																	
Shallow Fishplates.		6¾	7¾	9	10½	13¼	14¾	16½	18	19¼	21¼	23½	28¾	31	33¾	36¼	39
Angle Fishplates.		9¼	10¾	12½	15	19	21	23¾	26¼	27¼	30¼	33½	41¾	45¼	49½	53½	57½

* The Section of Fishbolt Neck has been designed to suit the holes in the Standard Fishplates, but no recommendations for the designs of the complete Fishbolts have been drawn up.

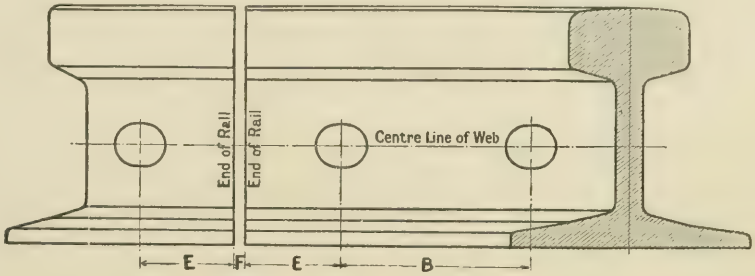
BRITISH STANDARD 6 BOLT FISHPLATES FOR FLAT BOTTOM RAILS.

KEY TO TABLE V.

POSITION OF BOLT HOLES IN FISHPLATES.

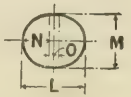


POSITION OF BOLT HOLES AT END OF RAILS.

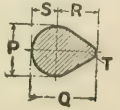


BOLT HOLE IN FISHPLATE.

BOLT HOLE IN RAIL.



SECTION OF FISHBOLT NECK.



BRITISH STANDARD 6 BOLT FISHPLATES FOR FLAT BOTTOM RAILS.

TABLE V.

No. of B.S. Section of Rail.		65	70	75	80	85	90	95	100
Length of Fishplate.	A	ins. 24	ins. 24	ins. 24	ins. 24	ins. 27	ins. 27	ins. 27	ins. 27
Centres of Bolt Holes in Fishplates.	B	4	4	4	4	4½	4½	4½	4½
	C	2	2	2	2	2¼	2¼	2¼	2¼
Centres of Bolt Holes in Rails.	B	4	4	4	4	4½	4½	4½	4½
	E	1⅞	1⅞	1⅞	1⅞	2⅛	2⅛	2⅛	2⅛
Clearance between Rails.	F	¼	¼	¼	¼	¼	¼	¼	¼
Dimensions of Bolt Holes in Fishplates.	G	1 3/32	1 3/32	1 11/64	1 11/64	1¼	1¼	1 13/32	1 13/32
	H	13/16	13/16	7/8	7/8	15/16	15/16	1 1/16	1 1/16
	I	1 1/16	1 1/16	47/64	47/64	25/32	25/32	7/8	7/8
	J	13/32	13/32	7/16	7/16	15/32	15/32	17/32	17/32
	K Radius	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32
Dimensions of Bolt Holes in Rails.	L	1	1	1 1/16	1 1/16	1⅛	1⅛	1¼	1¼
	M	7/8	7/8	15/16	15/16	1	1	1⅛	1⅛
	N	7/16	7/16	15/32	15/32	½	½	9/16	9/16
	O	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛
Diameter of Fishbolt.	P	¾	¾	13/16	13/16	7/8	7/8	1	1
Section of Fishbolt Neck.*	Q	1 1/32	1 1/32	1 7/64	1 7/64	1 3/16	1 3/16	1 11/32	1 11/32
	R	21/32	21/32	45/64	45/64	¾	¾	27/32	27/32
	S	⅜	⅜	13/32	13/32	7/16	7/16	½	½
	T Radius	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
WEIGHT PER PAIR IN LBS.									
Shallow Fishplates.		29¼	32½	35½	38½	47	51	54½	58½
Angle Fishplates.		41¼	46	50¾	55¾	68¼	74¾	80¼	86

* The Section of Fishbolt Neck has been designed to suit the holes in the Standard Fishplates, but no recommendations for the design of the complete Fishbolts have been drawn up.

APPENDIX.

FORMS

OF

BRITISH STANDARD TENSILE TEST PIECES.

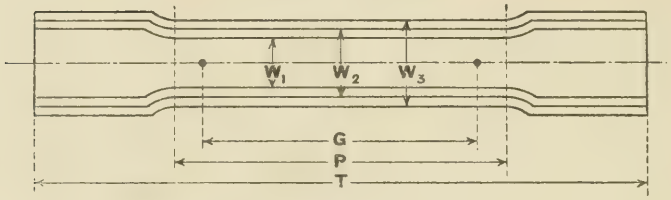
APPENDIX.

FORMS

OF

BRITISH STANDARD TENSILE TEST PIECES.

TEST PIECE **A.**

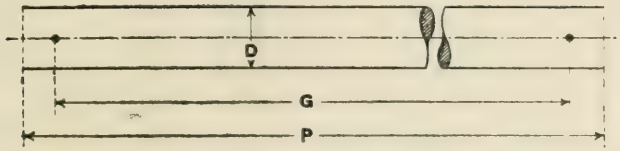


Gauge Length **G** = 8 inches.
Parallel Length **P** to be not less than 9 inches.
Total Length **T** = About 18 inches.

Thickness of Test Piece.	Maximum Width allowed.
Over $\frac{7}{8}$ in. (0·875 in.)	$W_1 = 1\frac{1}{2}$ ins.
$\frac{3}{8}$ in. (0·375 in.) to $\frac{7}{8}$ in. (0·875 in.)	$W_2 = 2$ ins.
Under $\frac{3}{8}$ in. (0·375 in.)	$W_3 = 2\frac{1}{2}$ ins.

The widths of the test pieces for plates were selected to comply with the two following conditions. (1) As the great bulk of plates to be tested are from $\frac{3}{8}$ inch to $\frac{7}{8}$ inch thick, it was desirable for the sake of convenience that the test pieces for such plates should be of uniform width, and, in accordance with very general practice, a width of 2 inches was selected. (2) With a test piece of a given form, the percentage of elongation was found to be less for thick plates than for thin ones; with steel of the same quality in other respects it was desirable therefore to choose widths of test piece which would be slightly in favour of the thicker plates. This is secured with the widths selected for the Standard Test piece of Form **A.**

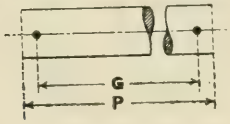
TEST PIECE **B.**



Gauge Length **G** to be not less than 8 times the diameter **D**.
With enlarged ends :—Parallel Length **P** to be not less than 9 times the reduced diameter **D**.

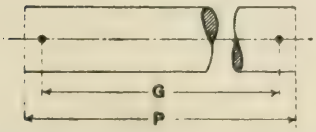
All test pieces of form **B** are strictly similar, and for the same material give the same percentage of elongation. They are nearly similar to a test piece of form **A**, 8 inches in gauge length, 2 inches wide and $\frac{3}{8}$ inch thick.

TEST PIECE **C.**



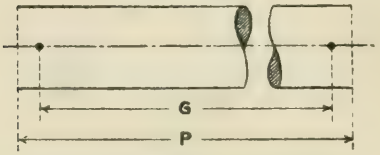
Gauge Length **G** = 2 inches.
Parallel Length **P** to be not less than $2\frac{1}{4}$ inches.
Dia. = 0·564 inch.
Area = $\frac{1}{4}$ sq. inch.

TEST PIECE **D.**



Gauge Length **G** = 3 inches.
Parallel Length **P** to be not less than $3\frac{3}{8}$ inches.
Dia. = 0·798 inch.
Area = $\frac{1}{2}$ sq. inch.

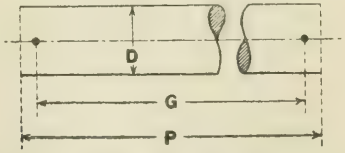
TEST PIECE **E.**



Gauge Length **G** = $3\frac{1}{2}$ inches.
Parallel Length **P** to be not less than 4 inches.
Dia. = 0·977 inch.
Area = $\frac{3}{4}$ sq. inch.

Test pieces **C, D** and **E** were arranged to meet the very common practice of making test pieces for forgings, axles, tyres, etc , of either $\frac{1}{4}$ square inch or $\frac{1}{2}$ square inch in sectional area. With the gauge lengths decided upon, these three forms are very nearly similar, and, for a given material, give very approximately the same percentage of elongation. Though not exactly, they are approximately similar to the Standard Test Piece **F,** and for the same material give a nearly identical, but slightly greater, percentage of elongation.

TEST PIECE **F.**
(For Test Pieces over 1 inch diameter.)



Gauge Length **G** to be not less than 4 times the diameter **D.**
With enlarged ends :—Parallel Length **P** to be not less than $4\frac{1}{2}$ times the reduced diameter **D.**

In some testing machines it was found inconvenient to use form **B** for bars of over 1 inch in diameter, and form **F** of half the gauge length is designed to meet such cases. For a given material the percentage of elongation with Test Piece **F** is greater than with Test Piece **B,** and this difference is provided for in the British Standard Specifications.

FORM OF ENDS.

In the case of the round Test Pieces **B, C, D, E** and **F,** the form of the ends is to be as required in order to suit the various methods employed for gripping the test piece. When enlarged ends are used the length of the parallel portion of the test piece must in no case be less than that noted on the diagrams.

British Engineering Standards Association.

PRICE LIST

OF

BRITISH STANDARD SPECIFICATIONS AND REPORTS.

NOVEMBER, 1919.

(This List cancels all previous Lists.)

NOTE.—*A number of the Publications of the Association are being issued in French, Italian, Spanish and Portuguese. The majority of the English Editions and all the Foreign Translations (which also include the English text) are being published in octavo form, and will be available at 1/- net per copy or its equivalent in Foreign moneys.*

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2-1903.	**Tramway Rails and Fishplates,** Specification and Sections of	1/-	1/3
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40-1908.	**Cast Iron Low Pressure Heating Pipes,** Specification for Spigot and Socket	1/-	1/2
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